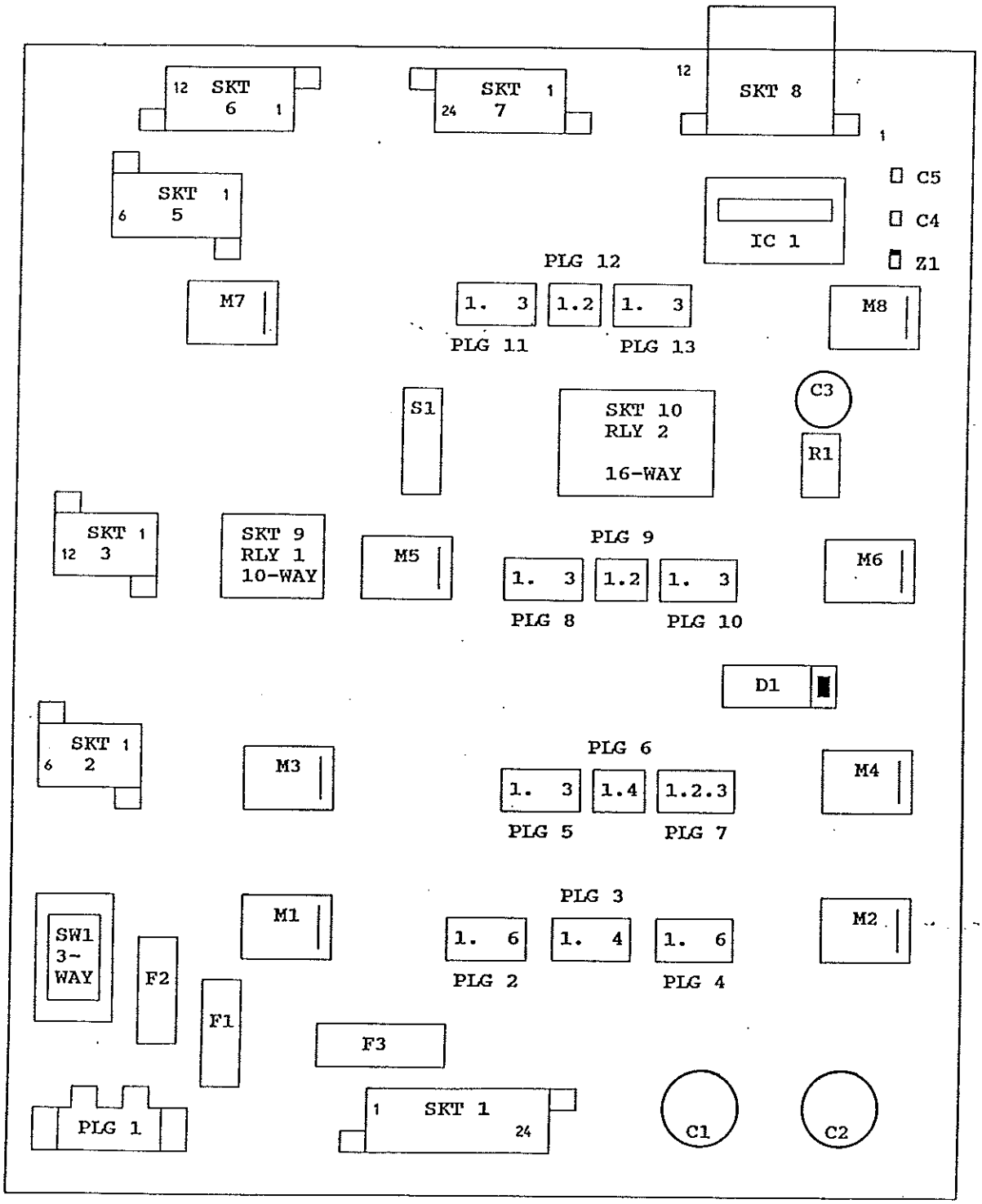
11

APPENDICES AND CIRCUIT DIAGRAMS

11. APPENDICES AND CIRCUIT DIAGRAMS



M1 - M8 = PCB Mountings

Figure 11.1 Compact laser motherboard connection and pin location diagram

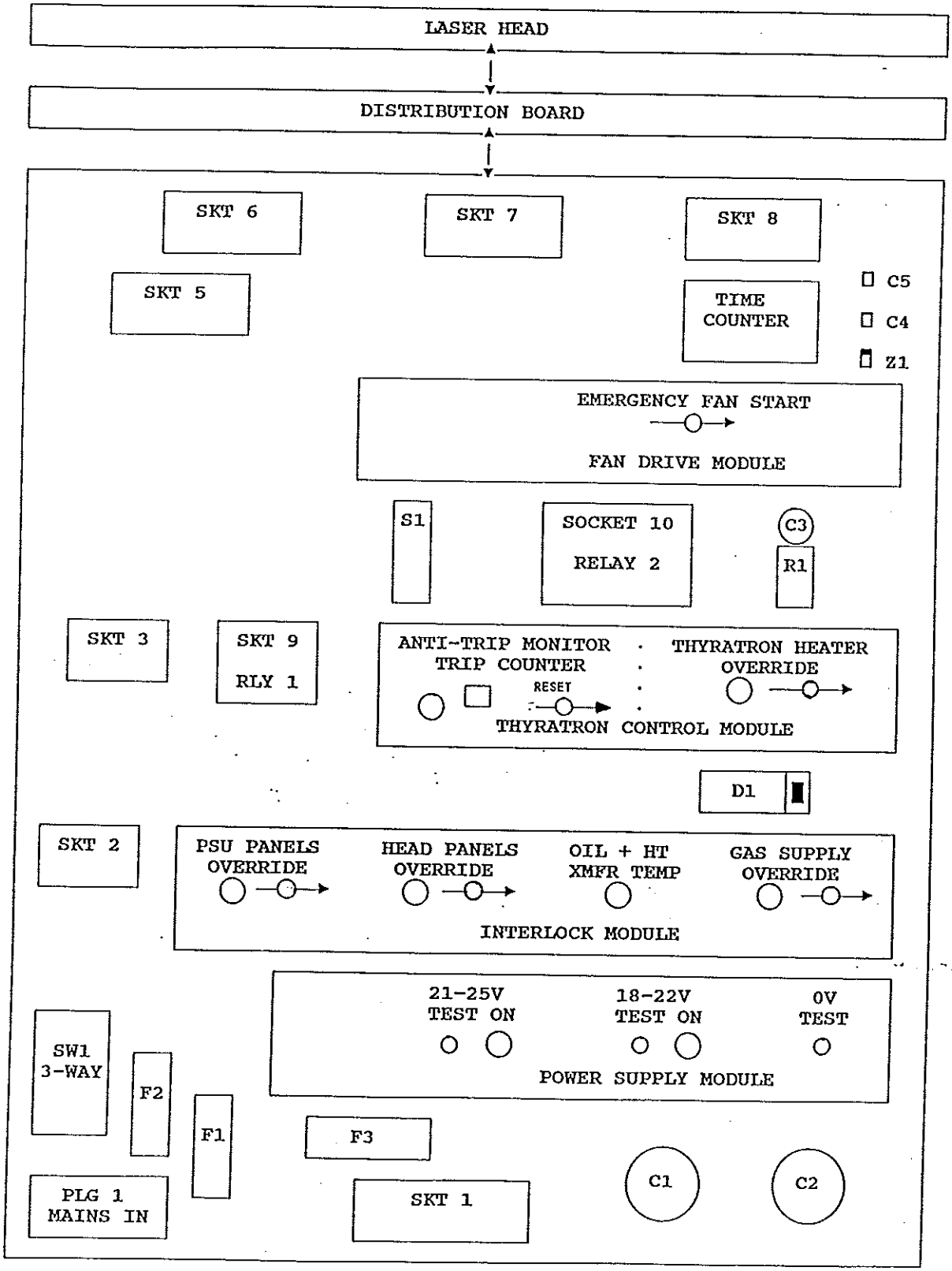


Figure 11.2 Compact laser motherboard module and component location diagram

COMPACT LASER MOTHERBOARD WIRING SCHEDULE

FROM	TO	WIRE TYPE	DESCRIPTION
Motherboard	Low voltage side of PSU		
SKT 1 /01	Fan live	16/0.2	240V AC
/02	Fan neutral	16/0.2	240V AC
/03	Emergency stop switch A, 240V send	16/0.2	240V AC
/04	Key switch A 240V send	16/0.2	240V AC
/05	Pump live (pump connector 1)	16/0.2	240V AC
/06	Pump neutral (pump connector 2)	16/0.2	240V AC
/07	Emergency stop switch A 240V return	16/0.2	240V AC
/08	Keyswitch A 240V return	16/0.2	240V AC
/09	Clock pulser live	16/0.2	240V AC
/10	Clock pulser neutral	16/0.2	240V AC
/11	Pump earth (pump connector 3)	16/0.2	Ground
/12	Clock pulser earth	16/0.2	Ground
/13	Power on lamp send	16/0.2	24V
/14	Power on lamp return	16/0.2	24V
/15	N/C		
/16	N/C		
/17	Key switch B 24V send	16/0.2	24V
/18	Key switch B 24V return	16/0.2	24V
/19	External interlock send (back panel)	16/0.2	Signal
/20	Battery negative	16/0.2	12V
/21	Emergency stop switch B 24V send	16/0.2	24V
/22	Emergency stop switch B 24V return	16/0.2	24V
/23	External interlock return (back panel)	16/0.2	Signal
/24	Battery positive	16/0.2	12V

FROM	TO	WIRE TYPE	DESCRIPTION
Motherboard	Contactor 1 and aux contactor		
SKT 2 /01	Contactor 1, Coil positive A1	16/0.2	240V AC
/02	Neutral out, aux 43	16/0.2	240V AC
/03	Neutral in, aux 44	16/0.2	240V AC
/04	Contactor 1,coil A2	16/0.2	240V AC
/05	Live out, aux 53	16/0.2	240V AC
/06	Live in, aux 54	16/0.2	240V AC

COMPACT LASER MOTHERBOARD WIRING SCHEDULE

FROM	TO	WIRE TYPE	DESCRIPTION
Motherboard	Power Supply Voltage Transformer		
SKT 3 /01	8 0V (for 15V)	30/0.25	0V
/02	N/C		
/03	1 208V input	30/0.25	208V AC
/04	9 15V input	30/0.25	15V
/05	N/C		
/06	3 240V input	30/0.25	240V AC
/07	7 17V input	30/0.25	17V
/08	2 220V input	30/0.25	220V AC
/09	0 Neutral (for 208,220,240 volt)	30/0.25	240V AC
/10	6 0V input (for 17V input)	30/0.25	0V
/11	4 Neutral (for 240V output)	30/0.25	240V AC
/12	5 240V output		24V DC

FROM	TO	WIRE TYPE	DESCRIPTION
Motherboard	Contactor 2		
SKT 5 /01	Contactor 2, coil A1	16/0.2	240V AC
/02	N/C		
/03	N/C		
/04	Contactor 2, coil A2	16/0.2	240V AC
/05	N/C		
/06	N/C		

COMPACT LASER MOTHERBOARD WIRING SCHEDULE

FROM	TO	WIRE TYPE	DESCRIPTION
Motherboard	Gas control + power controller		
SKT 6 /01	Gas control pump valve positive	16/0.2	Signal
/02	N/C		
/03	Fast pumpout switch send	16/0.2	Signal
/04	Pressure interlock send	16/0.2	Signal
/05	Pin 9 Condition Timer "D-type"		
	Fast gas in switch return	16/0.2	Signal
/06	Fast pumpout switch return	16/0.2	Signal
/07	Pressure Interlock return	16/0.2	Signal
/08	Pump valve negative	16/0.2	Signal
/09	Fast gas in switch send	16/0.2	Signal
/10	Power controller live	30/0.2	240V AC
/11	Power controller neutral	30/0.2	240V AC
/12	Power controller earth	30/0.2	Ground
NB:	Gas pressure switch 7 - N/O		
	4 - C		
Vacuum switch	6 - N/C		
	3 - C		
Condition Timer	Gas control		
D-type /10	Fast gas in valve	16/0.2	Signal

COMPACT LASER MOTHERBOARD WIRING SCHEDULE

FROM	TO	WIRE TYPE	DESCRIPTION
Motherboard	Distribution board		
SKT 7 /01	PLG 2/4 Remote start out		Signal
/02	PLG 2/3 Fast gas in/sol Vv out		Signal
/03	PLG 2/2 Fast pumpout sol Vv out		Signal
/04	PLG 2/1 Head aux return interlock(temp)		Signal
/05	PLG 2/8 Laser head remote stop return		Signal
/06	PLG 2/7 RLY 10 (oil + dump microswitch)		Signal
/07	PLG 2/6 Oil tank temp switch return		Signal
/08	PLG 2/5 Head panel microswitch return		Signal
/09	PLG 2/12 Thyratron controller interlock return		Signal
/10	PLG 2/11 Laser head remote stop return		Signal
/11	PLG 2/10 PSU panel microswitch return		Signal
/12	PLG 2/9 Laser head fans		24V DC
/13	PLG 2/16 PSU microswitch return		Signal
/14	PLG 2/15 N/C		
/15	PLG 2/14 From dumpswitch		Signal
/16	PLG 2/13 Remote start reform/HT on		Signal
/17	PLG 2/20 N/C		
/18	PLG 2/19 (240V) neutral 2		Signal
/19	PLG 2/18 240V thyratron heater + fans		Signal
/20	PLG 2/17 Neutral 1		Signal
/21	PLG 2/24 0V		0V
/22	PLG 2/23 24V (delay to interlocks)		240v AC
/23	PLG 2/22 live 2		240v AC
/24	PLG 2/21 live 1		240v AC

COMPACT LASER MOTHERBOARD WIRING SCHEDULE

FROM	TO	WIRE TYPE	DESCRIPTION
Motherboard	Auto sequence board PLG 3 and Condition Timer "D-type"		
SKT 8 /01	Pin 1 D HT on	16/0.2	24V
/02	PLG 3/2 Start	16/0.2	Signal
/03	PLG 3/3 Interlocks OK (none overridden)	16/0.2	Signal
/04	PLG 3/4 Interlocks OK (possibly overidden)	16/0.2	Signal
/05	PLG 3/5 Trip overcount/heater ready	16/0.2	Signal
/06	Pin 5 D Ground	16/0.2	Ground
/07	Pin 11D Fast gas out request	16/0.2	Signal
/08	Pin 3 D Timer start	16/0.2	24V
/09	PLG 3/9 Standby relay (to RLY 1)	16/0.2	Signal
/10	PLG 3/10 Thyratron controller interlock return	16/0.2	240V AC
/11	PLG 3/11 Stop	16/0.2	24V
/12	Pin 7 D 7 sec delay	16/0.2	24V

COMPACT LASER WIRING SCHEDULE

FROM	TO	WIRE TYPE	DESCRIPTION
Auto Sequence board	Power controller + gas interlocks		
SKT10 /01	Power controller plug pin C	16/0.2	Signal
/02	Power controller plug pin A	16/0.2	Signal
/03	Vacuum interlock return	16/0.2	Signal
/04	Power controller plug pin D	16/0.2	Signal
/05	Power controller Plug pin B	16/0.2	Signal
/06	Vacuum Interlock send	16/0.2	Signal
Auto Sequence board	Condition Timer "D-type"		
PLG3 /01	Pin 2 HT on	16/0.2	Signal
/06	Pin 6 Ground	16/0.2	Ground
/07	Pin 12 Fast gas out valve	16/0.2	24V
/08	Pin 4 Start	16/0.2	Signal
/12	Pin 8 7 sec delay	16/0.2	Signal

COMPACT LASER WIRING SCHEDULE

FROM	TO	WIRE TYPE	DESCRIPTION
Distribution Board	High voltage side of PSU		
SKT12 /01	Case interlock A	16/0.2	Signal
/02	SKT 12/3	16/0.2	Signal
/03	SKT 12/2	16/0.2	Signal
/04	HT breaker out (6)	16/0.2	Signal
/05	Temp interlock return	16/0.2	Signal
/06	HT TX interlock return	16/0.2	Signal
/07	Case interlock A	16/0.2	Signal
/08	HT breaker return (7)	16/0.2	Signal
/09	Temp interlock send	16/0.2	Signal
/10	HT TX interlock send	16/0.2	240V AC
/11	24V HT on lamp	16/0.2	24V
/12	0V HT on lamp	16/0.2	0V
/13	Dump microswitch common	16/0.2	Signal
/14	Dump microswitch N/O	16/0.2	Signal
/15	N/C		
/16	Thyratron controller interlock return	16/0.2	Signal
/17	Dump coil live	16/0.2	
/18	Heater live	16/0.2	240V AC
/19	Fan live	16/0.2	240V AC
/20	Thyratron controller interlock out	16/0.2	Signal
/21	Dump coil Neutral	16/0.2	12V
/22	Heater neutral	16/0.2	240V AC
/23	Fan neutral	16/0.2	240V AC

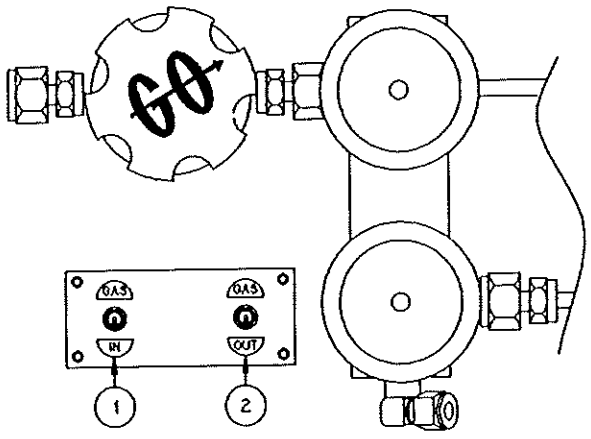
COMPACT LASER HEAD WIRING SCHEDULE

FROM		TO	WIRE TYPE	DESCRIPTION
Distribution Board		Laser 12-Way Head Connector	12-Way Cable	
CON	/01	12-Way Burndy in head PIN A	Black	240V AC
	/02	12-Way Burndy in head PIN B	Brown	240V AC
	/03	12-Way Burndy in head PIN C	Red	0V to each valve
	/03	Earth Braid	Braid	
	/04	12-Way Burndy in head PIN D	Orange	
	/05	12-Way Burndy in head PIN E	Yellow	Gas Out
	/06	12-Way Burndy in head PIN F	Green	
	/07	12-Way Burndy in head PIN G	Blue	
	/08	12-Way Burndy in head PIN H	Violet	
	/09	12-Way Burndy in head PIN J	Grey	
	/10	12-Way Burndy in head PIN K	White	
	/11	12-Way Burndy in head PIN L	Turquoise	Fast Gas in
	/12	12-Way Burndy in head PIN M	Pink	Fast Gas Out

FROM		TO	WIRE TYPE	DESCRIPTION
12 way head connector		Connections in laser head box		
Pin	A	240V fan live	Black	240V AC
	B	240V fan neutral	Brown	240V AC
	C	HT on light, fans, filter box pin 6, gas connector pin A	Red	0V to each valve
	D	Filter box pin 5	Orange	
	E	Gas connector pin B, interlock send,		Gas out
		filter box pin 1 + 2 (link on PCB)	Yellow	24V
	F	Filter box pin 3	Green	
	G	Filter box pin 4, HT on	Blue	
	H	Dirt monitor	Violet	
	J	Head case interlock return	Grey	
	K	Positive fans	White	
	L	Gas connector pin C	Turquoise	Fast gas in
	M	Gas connector pin D	Pink	Fast gas out

COMPACT LASER HT SIDE WIRING SCHEDULE

FROM	TO	WIRE TYPE	DESCRIPTION
Feedthrough PCB	HT Monitor Board		
SKT 3 /01	N/C		
/02	N/C		
/03	PLG 1/9	6 way	Signal
/04	N/C		
/05	PLG 1/3	6 way	Signal
/06	Thyristor Driveboard/1	Red 2 way	Signal
/07	N/C		
/08	PLG 1/5	6 way	Signal
/09	N/C		
/10	PLG 1/2	6 way	Signal
/11	Thyristor Driveboard/2	Black 2 way	Signal
/12	PLG 1/6	6 way	Signal
/13	N/C		
/14	N/C		
/15	PLG 1/8	6 way	Signal



COMPACT LASER 'D' PLUG LEAD WIRING SCHEDULE

FROM	TO	DESCRIPTION
HT Sense PCB 9 Way Plug	Feedthrough PCB 15 Way SKT	
1	6	Vi Lo
2	12	I Lo
3	5	I Hi
5	8	V_2 Hi
6	14	V_1 Hi
9	15	V_2 Lo
N/C	3	Control Lo
N/C	11	Control Hi
Feedthrough PCB 15 way SKT	Feedthrough PCB 9 way SKT	
6	6	Vi Lo
12	3	I Lo
5	7	I Hi
8	N/C	V_2 Hi
14	1	V_1 Hi
15	N/C	V_2 Lo
3	9	Control Lo
11	4	Control Hi
Feedthrough PCB 9 way SKT	Power controller 9 way SKT	
6	2	Vi Lo
3	4	I Lo
7	3	I Hi
N/C	N/C	V_2 Hi
1	1	V_1 Hi
N/C	N/C	V_2 Lo
9	6	Control Lo
4	5	Control Hi

COMPACT LASER METER LEAD WIRING SCHEDULE

FROM	TO	DESCRIPTION	
Back Panel 9 way SKT	Feedthrough PCB 9 way PLUG		
1	1	Aux Current (%)	- AUX
6	6		+ AUX
8	8	Current (mA)	- I
3	3		+ I
5	5	Voltage (kV)	- V
9	9		+ V

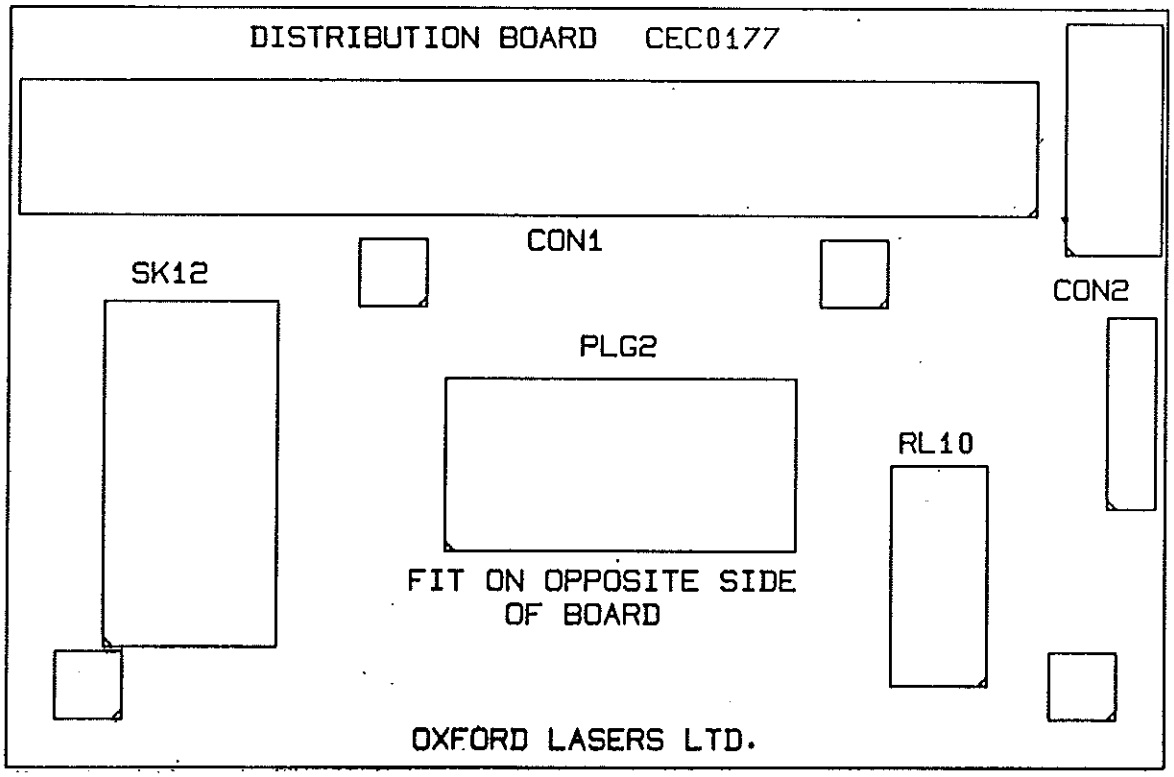


Figure 11.3 Compact laser distribution board

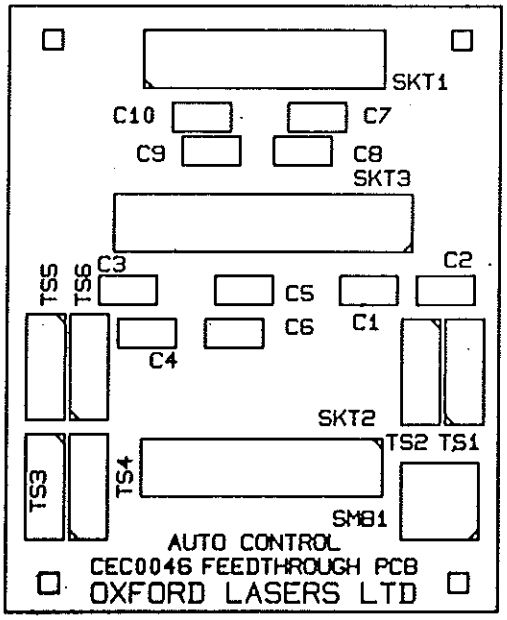


Figure 11.4 Compact laser feedthrough board

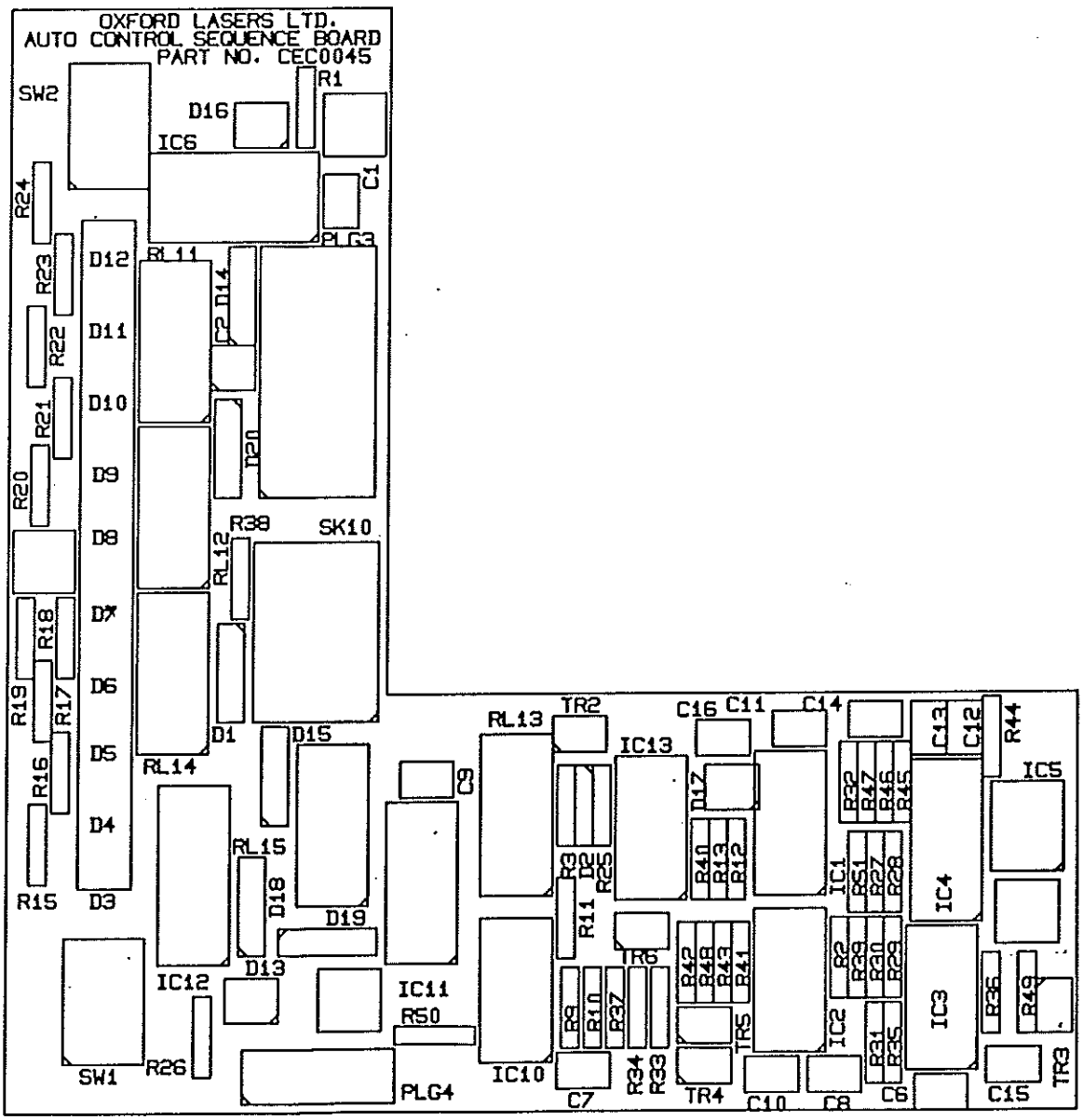


Figure 11.5 Compact laser auto-sequencer PCB

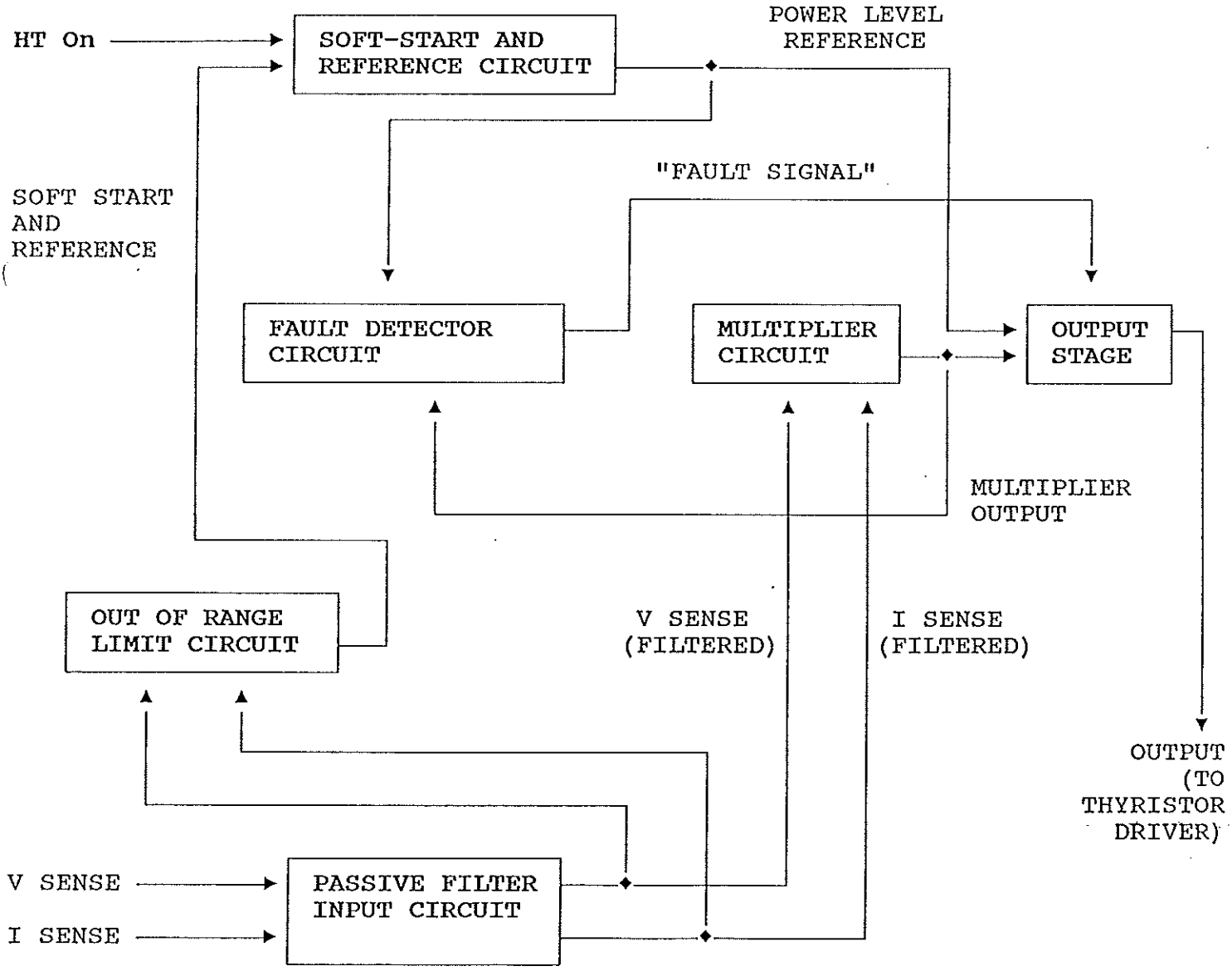


Figure 11.6 Compact laser power controller unit functional block diagram

COMPACT LASER POWER CONTROLLER WIRING SCHEDULE

FROM	TO	WIRE TYPE	DESCRIPTION
Power controller box	Power controller PCB		
Bulgin SKT (L)	Fuse holder	16/0.2	240V send (fuse)
Fuse holder	SKT 1-1	16/0.2	240V return (fuse)
Bulgin SKT (N)	SKT 1-2	16/0.2	Neutral
Bulgin SKT (E)	Case	16/0.2	Earth
D SKT - 1	SKT 2-1	7/0.2	V SENSE HI
D SKT - 2	SKT 2-2	7/0.2	V SENSE LO
D SKT - 3	SKT 2-3	7/0.2	I SENSE HI
D SKT - 4	SKT 2-4	7/0.2	I SENSE LO
D SKT - 5	SKT 4-7	7/0.2	CONT OUT HI
D SKT - 6	SKT 4-8	7/0.2	CONT OUT LO
8 way burndy A	SKT 3-1	7/0.2	IND HI
8 way burndy B	SKT 3-2	7/0.2	IND LO
8 way burndy D	SKT 3-3	7/0.2	HT ON HI
8 way burndy C	SKT 3-4	7/0.2	HT ON LO
SKT 4-4	SKT 4-2 (NOT CONNECTED)	7/0.2	12V for indicator
SKT 4-3	Indicator (NOT CONNECTED)	Lead	Indicator send
Fault indicator	SKT 4-5 (NOT CONNECTED)	Lead	Indicator return

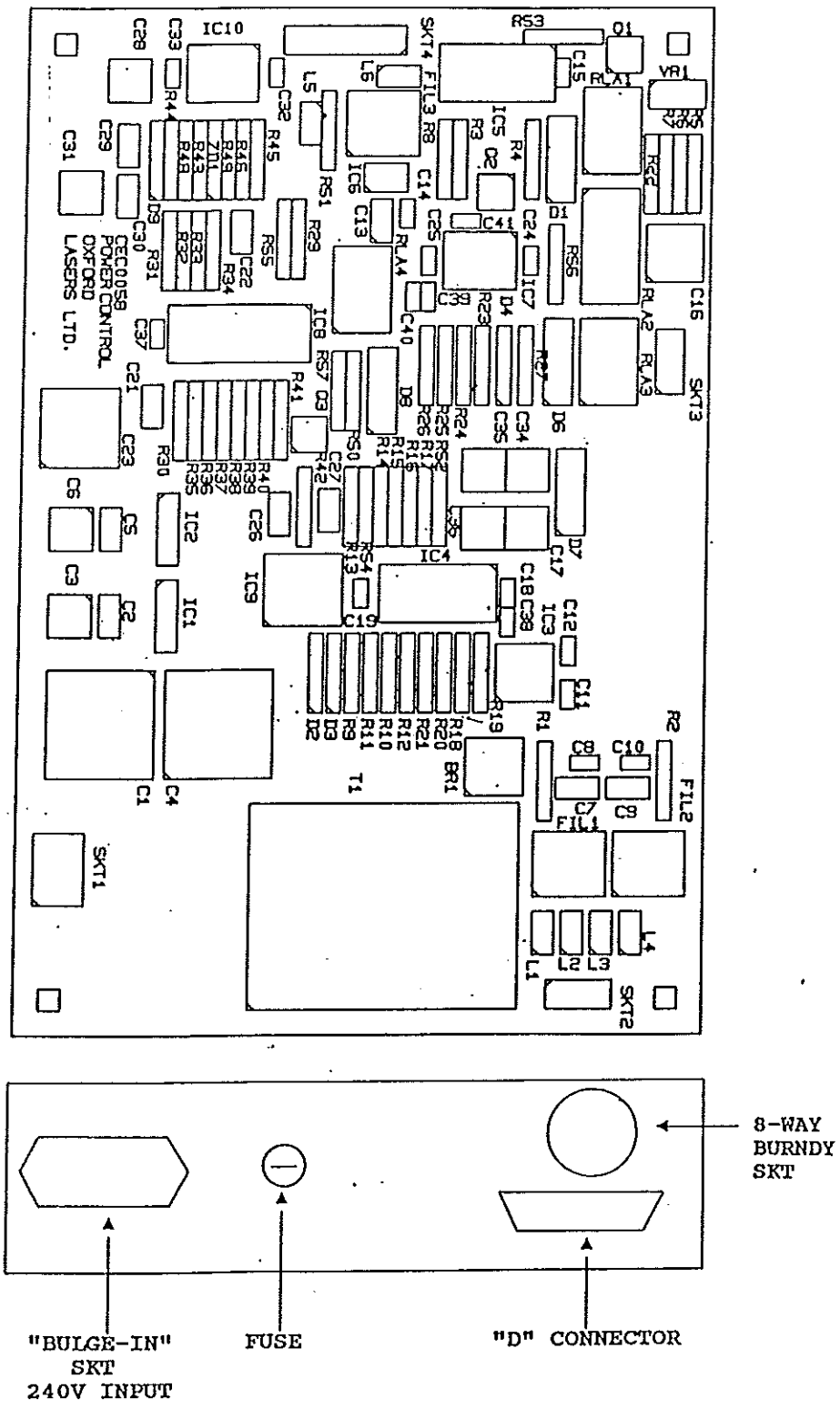


Figure 11.7 Compact laser power controller unit PCB